

Notice of Allowability

Application No.

10/531,231

Examiner

Charles Chow

Applicant(s)

MANKU, TAJINDER

Art Unit

2618

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 5/18/2007.
2. ☒ The allowed claim(s) is/are 19-27.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some* c) ☐ None of the:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
- ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
- ☐ Notice of Informal Patent Application
- ☒ Interview Summary (PTO-413), Paper No./Mail Date 5/22/2007.
- ☒ Examiner's Amendment/Comment
- ☒ Examiner's Statement of Reasons for Allowance
- ☐ Other _____.

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Detailed Action

1. This office action is for amendment received on 5/11/2007.

EXAMINER'S AMENDMENT

2. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment has been given from attorney Shin Hung in a telephone interview on May 22, 2007, for amending claim 19 as follows:

In line 9 of **claim 19**, after the "to reduce the", inserting ----current-----.

Allowable Subject Matter

3. The following is an examiner's statement of reasons for allowance:

Claims 19-27 allowable over the prior art of record. The prior arts fail to teach the allowable features, singly, particularly, or in combination.

Applicant has canceled rejected claims 1-18 & added new independent claims 22-27 which are depending upon the independent claims 19-20, being been indicated with allowability in the last office action.

The dependent claims are also allowable due to their dependency upon the allowable independent claims above and the having additional claimed features.

The prior arts fail to teach the features in **claim 19**, for the key features in below together with other features, having foreign priority date of 10/15/2002, for the method of signal demodulation for a circuit having

a differential transconductance input cell consisting of separate positive and negative channels... and amplifying said positive and negative channels of said input signal $x(t)$;

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a first differential mixer...; a second differential mixer...;

a pair of current sources I_a and I_b for providing current to respective ones of said positive and negative channels of said differential transconductance input cell, to reduce the drawn from said first differential mixer;

said current sources I_a and I_b being trimmed in a complementary manner where $I_a = I + \Delta I$, and $I_b = I - \Delta I$;

said method comprising the steps of:

injecting a two-tone signal at said input;

measuring IM2 at the baseband output of said circuit;

determining the level of ΔI which minimizes IM2;

recording the level of ΔI which minimizes IM2; and

using said recorded level of ΔI during normal operation of said down-converter.

The prior arts fail to teach the features in **claim 20**, for the combined features together with the trimming said current sources I_a and I_b in a complementary manner where $I_a = I + \Delta I$, and $I_b = I - \Delta I$;

wherein ΔI can be manipulated to reduce the IM2 and DC offset in the output signal Φ_1 , $\Phi_2 \times(t)$, and wherein matching parameters for said mixers can be relaxed.

The closest prior art, **Durec [US 6,144,846]**, teaches the compound mixer in series for the down conversion [Fig. 1-5 & its description in specification], with the frequency of local oscillator signal substantially different from the frequency of rf input [col. 1, lines 36-41], to prevent LO pulling, pushing [col. 1, lines 29-33], but fails to teach the steps of injecting a two-tone signal at said input; measuring IM2 at the baseband output of said circuit; determining the level of ΔI which minimizes IM2; recording the level of ΔI which minimizes IM2; and using said recorded level of ΔI during normal operation of said down-converter.

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Other reference, **Khoury et al. [US5,532,637]**, teaches in Fig. 4 & its description in specification, the shared output 19, 20 from mixers 33, 34, having injection current sources 25, 26 for the input differential amplifiers 11, 12, to reduce the distortion by adjusting 25, 26 [col. 4, line 13 to col. 5, line 13], but also fails to teach the features missed by Durec above.

Other prior arts in below has been considered, but they fail to teach the above allowable features.

Souetinov et al. (US 6,308,058 B1) teaches in Fig. 2 & its description in specification, the mixers 294, 295 having input differential 290 with adjustable biasing voltage at 260-262 to cancel the second harmonic [abstract].

Hong et al. (US 5,859,559) teaches trickle current injection 84, 85 to transconductance input cell to improve the third order intercept point [Fig. 2, abstract, col. 4, lines 4-30].

Bergsma et al. (US 6,711,396 B1) teaches the compensator circuit to inject currents which can be adjusted via bias 1/bias 2 [Fig. 11, col. 11, line 52 to col. 12, line 33 & col. 3, lines 18-46], to improve the mismatching in circuit branches [col. 2, lines 1-31].

Zhou (US 2003/0216,128A1) teaches the IM2 & DC offset is due to the mismatching, imbalancing, in the mixer circuit, which causes the IM2 & DC offset in the mixer [paragraph 0024, 0047], to improve the IM2 & DC offset of a mixer via better matching, balancing, in the mixer circuit.

Gilmore (US 7,013,120B2) teaches the high pass filter 812, 820 between two mixers, [Fig. 8].

Khorram (US 6,801,761B2) teaches the gated current source controlled by 142, Fig. 6, to balancing with the +/- ΔI in [col. 7, line 59 to col. 8, line 19, Fig. 6].

Laws (US 5,303,417) teaches the LO vco in Fig. 5 for generating local oscillator signal for mixer Mix1I & Mix2I, for the direction conversion [col. 3, lines 44-55].

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Kazakevich (US 2001/0041,546 A1) teaches the local oscillator 11 tuned to half of the input carrier frequency, by a divider factor of 2 [Fig. 1, paragraph 0012], in order to reduce the interference from the local oscillator LO leakage [paragraph 0002, 0007].

Other prior arts are also considered. They are **Cowley (US 6,714,263)**, **Tanabe et al. (US 4,461,042)**, **Peterov et al. (US 7,139,546)**, **Wong et la. (US 7,130,604B1)**, **Balboni (US 6,882,834 B1)**, **Schelmbauer (US 7,138,857)**, **Nguyen et al. (US 2002/0050,861 A1)**, **Kovacevic et al. (US 2003/0216,131 A1)**, **Balteanu (US 6,438,365 B1)**, **Clark et al. (US 6,041,077)**, **Manku et al. (US 6,973,297 B1)**, **Allot et al. (US 2002/0160,738 A1)**, **Marz (US 5,390,346)**, **Kurihara et al. (US 4,394,626)**.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion


4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Charles C. Chow whose telephone number is (571) 272-7889. The examiner can normally be reached on 8:00am-5:30pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Urban can be reached on (571) 272-7899. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR

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only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Charles Chow *cc*

May 21, 2007.


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